

## VITAMIN D AND CARDIOVASCULAR OUTCOMES

**AFIFA JAHAN & SHARANYA**

*Department of Food and Nutrition, Post Graduate & Research Centre, Professor Jayashankar*

*Telangana State Agricultural University, Rajendranagar, Hyderabad, India*

### ABSTRACT

*Cardiovascular disease (CVD) is a class of diseases that involve the heart or blood vessels. Cardiovascular diseases (CVDs), including heart failure and coronary artery disease are a major cause of morbidity and mortality worldwide.*

*Wang et al., 2008 and Ginde et al., 2009 reported that there is an epidemiological evidence of CVDs and vitamin D deficiency. According to the Vacek, 2012., Vitamin D deficiency was associated with a significant risk of cardiovascular disease and reduced survival and vitamin D supplementation was associated with better survival.*

**KEYWORDS:** *Heart or Blood Vessels, Heart Failure, Mortality Worldwide & Better Survival*

**Received:** Mar 10, 2017; **Accepted:** Mar 30, 2017; **Published:** Apr 20, 2017; **Paper Id.:** IJASRJUN20177

### INTRODUCTION

A study conducted with a sample that included 272 patients (141 men) aged 33-89 years reported that when analyzed according to patient gender and the presence/absence of coronary artery disease, and when using a lower vitamin D cut off ( $< 25$  nmol/L), there was apparently no relationship between plasma vitamin D level and risk of muscle-related adverse effects (MAEs) in statin users (Eisen *et al.*, 2014). Between 2002 and 2008, 160 cases of symptomatic vitamin D deficiency were identified.

Supplemental Ca and Vitamin D significantly increases  $25(\text{OH})\text{D}_3$  concentrations and decreases LDL-C. Women with higher  $25(\text{OH})\text{D}_3$  concentrations have more favourable lipid profiles, including increased HDL-C, lower LDL-C, and lower TG. Schnatz *et al.*, 2014 reported that higher concentrations of  $25(\text{OH})\text{D}_3$ , in response to Calcium-vitamin D supplementation, are associated with improved LDL-C

According to Zittermann *et al.*, 2013 vitamin D deficiency is prevalent in cardiac surgical patients and are independently associated with the risk of major cardiac and cerebrovascular events MACCE at levels  $< 100$  nmol/L in Central Europe. Pilz *et al.*, 2011 and Brewer *et al.*, 2011 reported reduced  $25(\text{OH})\text{D}_3$  concentrations in patients with previous and prevalent cardiovascular or cerebrovascular diseases.

The association between vitamin D status and cardiovascular diseases (heart diseases, stroke, hypertension and coronary artery calcifications etc) was supported by ecological evidences reported by Wang *et al.*, 2008; Kristal-Boneh *et al.*, 1997; Scragg *et al.*, 1990; Watson *et al.*, 1997; Poole *et al.*, 2006 and Fleck *et al.*, 1989. Pittas *et al.*, 2010 reported that when this evidences were summarized by meta analyses of observational studies it was found to be an inverse association between 25-hydroxyvitamin  $\text{D}_3$  and cardiovascular risk.

Muscogiuri *et al.*, 2012., reported that vitamin D deficiency is associated with risk of CVD and this may be due to the relationship between low vitamin D levels and Diabetes, Hypertension, endothelial dysfunction and Obesity.

Various studies reporting association between CVD and VDD in context of increased prevalence of coronary artery disease (CAD), vascular calcification and essential hypertension have been conducted (Zittermann *et al.*, 2005).

Low levels of 25(OH)D<sub>3</sub> are also associated with increased risk of CVD and mortality. A meta-analysis of seven studies showed that when adjusting for cardiovascular risk factors, the risk of cerebrovascular disease was significantly reduced in individuals with high 25(OH)D<sub>3</sub> levels (Chowdhury *et al.*, 2012).

According to Pilz *et al.*, 2011 randomized controlled trial are sparse and have partially, but not consistently, shown some beneficial effects of vitamin D supplementation on cardiovascular risk factors (e.g. arterial hypertension).

Chowdhury *et al.*, 2012 and Sun *et al.*, 2012, reported from several observational studies that vitamin D deficiency is also an independent risk factor for stroke.

Kienreich *et al.*, 2013 reported that stroke patients are at high risk of musculoskeletal complications, including fractures and falls that are related to VDD.

The results of a study conducted in India showed that deficiency of 25-(OH)D<sub>3</sub> was significantly associated with dyslipidemia. Multivariate analysis also showed that 25-(OH)D<sub>3</sub> deficiency was independently associated with dyslipidemia (odds ratio: 1.9; 95% CI:1.1–3.5) (Chaudhuri *et al.*, 2013).

## CONCLUSIONS

Supplemental Ca and Vitamin D significantly increases 25(OH)D<sub>3</sub> concentrations and decreases LDL-C. Women with higher 25(OH)D<sub>3</sub> concentrations have more favourable lipid profiles, including increased HDL-C, lower LDL-C, and lower TG. Results support that higher concentrations of 25(OH)D<sub>3</sub>, in response to Calcium-vitamin D supplementation, are associated with improved LDL-C (Schnatz *et al.*, 2014).

Low levels of vitamin D<sub>3</sub> increase inflammation, both directly and via increases in parathyroid hormone. Evidence that vitamin D deficiency may predispose to depression was reported by Hoang, 2011. Hypertension is a known cardiovascular risk factor (Lavie, 2011 and O'Keefe, 2012), and abnormalities in cognitive function.

## REFERENCES

1. Brewer, L. C., Michos, E. D and Reis, J. P. 2011. Vitamin D in atherosclerosis, vascular disease, and endothelial function. *Current Drug Targets*. 12: 54–60.
2. Chaudhuri, J. R., Mridula, K. R., Anamika, A., Boddu, D. B., Misra, P. K., Lingaiah, A., Balaraju, B and Bandaru, V. S. 2013. Deficiency of 25-hydroxyvitamin d and dyslipidemia in Indian subjects. *Journal of Lipids*. 2013: 623420.
3. Chowdhury, R., Stevens, S., Ward, H., Chowdhury, S., Sajjad, A and Franco, O. H. 2012. Circulating vitamin D, calcium and risk of cerebrovascular disease: a systematic review and meta-analysis. *European Journal of Epidemiology*. 27: 581–591.
4. Eisen, A., Lev, E., Iakobishvili, Z., Porter, A., Brosh, D., Hasdai, D and Mager, A. 2014. Low Plasma Vitamin D Levels and Muscle-Related Adverse Effects in Statin Users. *Israel medical association Journal*. 16: 42-45.
5. Fleck, A. 1989. Latitude and ischaemic heart disease. *Lancet* 1: 613.
6. Ginde, A. A., Mansbach, J. M and Camargo, C. A., Jr. 2009. Association between serum 25-hydroxyvitamin D level and upper

- respiratory tract infection in the Third National Health and Nutrition Examination Survey. *Archives of Internal Medicine*. 169: 384–390.
7. Hoang, M. T., Defina, L. F., Willis, B. L., Leonard, D. S., Weiner, M. F and Brown, E. S. 2011. Association between low serum 25-hydroxyvitamin D and depression in a large sample of healthy adults: the Cooper Center longitudinal study. *Mayo Clin Proc.* ;86:1050–1055.
  8. Kienreich, K., Grubler, M., Tomaschitz, A., Schmid, J., Verheyen, N., Rutters, F., Dekker, J. M and Pilz, S. 2013. Vitamin D, arterial hypertension & cerebrovascular disease. *Indian Journal of Medical Research*. 137: 669–679.
  9. Kristal-Boneh, E., Froom, P., Harari, G and Ribak, J. 1997. Association of calcitriol and blood pressure in normotensive men. *Hypertension*. 30: 1289–1294.
  10. Lavie, C. J., Milani, R. V., O’Keefe, J. H and Lavie, T. J. 2011. Impact of exercise training on psychological risk factors. *Prog Cardiovasc Dis.* ;53:464–470.
  11. Muscogiuri, G., Sorice, G. P., Ajjan, R., Mezza, T., Pilz, S., Priolella, A., Scragg, R., Volpe, S. L., Witham, M. D and Giaccari, A. 2012. Can vitamin D deficiency cause diabetes and cardiovascular diseases? Present evidence and future perspectives. *Nutrition Metabolism and Cardiovascular Diseases*. 22: 81–87.
  12. O’Keefe, J. H., Patil, H. R. and Lavie, C. J. 2012. Can vitamin D deficiency break your heart? *Mayo Clin Proc.* ;87:412–413.
  13. Pilz, S., Iodice, S., Zittermann, A., Grant, W. B and Gandini, S. 2011. Vitamin D status and mortality risk in CKD: a meta-analysis of prospective studies. *American Journal of Kidney Diseases*. 58 (3): 374–382.
  14. Pittas, A. G., Dawson-Hughes, B., Li, T., VanDam, R. M., Willett, W. C and Manson, J. E. 2006. Vitamin D and calcium intake in relation to type 2 diabetes in women. *Diabetes Care*. 29: 650–656.
  15. Pittas, A. G., Chung, M., Trikalinos, T., Mitri, J., Brendel, M., Patel, K., Lichtenstein, A. H., Lau, J., Balk, E. M. 2010. Systematic review: vitamin D and cardiometabolic outcomes. *Annals of Internal Medicine*. 152 (5): 307–314.
  16. Pittas, A. G., Lau, J., Hu, F. B and Dawson-Hughes, B. 2007. The role of vitamin D and calcium in type 2 diabetes. A systematic review and meta-analysis. *The Journal of Clinical Endocrinology & Metabolism*. 92: 2017–2029.
  17. Poole, K. E., Loveridge, N., Barker, P. J, Halsall, D. J., Rose, C., Reeve, J and Warburton, E. A. 2006. Reduced vitamin D in acute stroke. *Stroke*. 37: 243–245.
  18. Schnatz, P. F., Jiang, X., Vila-Wright, S., Aragaki, A. K., Nudy, M., O’Sullivan, D. M., Jackson, R., Leblanc, E., Robinson, J. G., Shikany, J. M., Womack, C. R., Martin, L. W., Neuhouster, M. L., Vitolins, M. Z., Song, Y., Kritchevsky, S and Manson, J. E. 2014. Calcium/vitamin D supplementation, serum 25-hydroxyvitamin D concentrations, and cholesterol profiles in the Women’s Health Initiative calcium/vitamin D randomized trial. *Menopause (New York, N.Y.)* 21 (8): 823–833.
  19. Scragg, R., Jackson, R., Holdaway, I. M., Lim, T and Beaglehole, R. 1990. Myocardial infarction is inversely associated with plasma 25-hydroxyvitamin D3 levels: a community-based study. *International Journal of Epidemiology*. 19: 559–563.
  20. Sun, Q., Pan, A., Hu, F. B., Manson, J. E and Rexrode, K. M. 2012. 25-hydroxyvitamin D levels and the risk of stroke: a prospective study and meta-analysis. *Stroke*. 43, 1470–1477.
  21. Vacek, J. 2012. Vitamin D Deficiency and Supplementation and Relation to Cardiovascular Health. *The American Journal of Cardiology*. 109 (3): 359–363.
  22. Wang, L., JoAnn, E., Manson, Julie, E., Buring, I-Min, L and Howard, D. S. 2008 a. Dietary Intake of Dairy Products, Calcium, and Vitamin D and the Risk of Hypertension in Middle-Aged and Older Women. *Hypertension*. 51: 1073–1079.

23. Watson, K. E., Abrolat, M. L., Malone, L. L., Hoeg, J. M., Doherty, T., Detrano, R and Demer, L. L. 1997. Active serum vitamin D levels are inversely correlated with coronary calcification. *Circulation*. 96: 1755–1760.
24. Zittermann, A., Kuhn, J., Dreier, J., Knabbe, C., Gummert and Borgermann, J. 2013. Vitamin D status and the risk of major adverse cardiac and cerebrovascular events in cardiac surgery. *European Heart Journal*. 34 (18): 1358-1364.
25. Zittermann, A., Schleithoff, S. S and Koefor, R. 2005. Putting cardiovascular disease and vitamin D insufficiency into perspective. *British Journal of Nutrition*. 94: 483-492.